

## **Geologic Atlas Of the City of Alexandria, Virginia and Vicinity**

### **Glossary of Geological Terms**

*aeromagnetic* – refers to measurements of the Earth's magnetic field made from an airplane

*accretion gley* –fine-grained sediment with a gleyed soil color (green, blue, or gray) that accumulated very slowly in a low, wet landscape position, typically by some combination of slope wash, overbank flooding, and(or) wind deposition

*alluvial* – pertaining to streams

*alluviation* – the filling of a stream channel or valley with alluvium

*alluvium* – sediment deposited by streams in channels, floodplains, alluvial fans, estuaries, and other riparian environments. Historically, the term has commonly been applied to deposits of modern streams, or at least those of relatively Recent geological time

*amphibolite* – dark-colored metamorphic rock composed predominantly of hornblende or other amphibole family minerals. Commonly formed by metamorphism of gabbro and basalt

*angular unconformity* – boundary or erosion surface representing a hiatus in the geologic record in which the older strata dip at a different angle than the strata above. In the map area, the older strata consist of complexly folded, faulted, and foliated igneous and metamorphic rocks of the Piedmont, whereas the strata above the unconformity are gently tilted Coastal Plain sediments of the Potomac Formation and flat lying stream terraces

*aquifer* – water bearing geologic formation capable of transmitting and yielding economically or environmentally significant quantities of water. The closely related concept of an *aquifer system* refers to several individual strata or permeable bodies that each act as an aquifer, and which are locally separated, but not entirely isolated hydraulically, from one another by less permeable units of silt and clay, and thus function collectively as a large, unified water-bearing system

*arkose* – sand or sandstone in which more than a quarter of the grains consist of feldspar, usually potassium feldspar derived from granitic rocks. The adjective *arkosic* refers to sand(stone) having the composition of arkose

*artesian* – condition in which hydrostatic pressure is greater than atmospheric pressure

*artificial fill* – material emplaced by man to fill or level uneven ground. Fill is commonly variable in its composition, consistency, degree of saturation, and other physical and chemical properties. The characteristic geologic deposit of the Anthropocene epoch

*backswamp* – swampy part of a floodplain located distant from the active stream channel and thus not susceptible to the regular action of strong currents

*backwater* – a creek or swale whose outlet is barred or blocked by a low body of sediment, producing a lake, lagoon, or swamp with little or no current

*bar* – the basic form of a sand wave propagating down a stream. Depending on the type of stream and the characteristics of the sediment load, bars may be elongated in a downstream direction parallel to the stream channel (*longitudinal bars*), perpendicular to the stream channel (*transverse bars*), or in half-moon to elliptical shapes that lie athwart part or all of the channel (*point bars*)

*base flow* – the sustained discharge of a stream, or the mean level of a lake or wetland, in the absence of surface runoff from storms

*batholith* – body of intrusive rock greater than 40 square miles in area

*bedrock* – the solid rock exposed at the surface or underlying unconsolidated soil or surficial sediments. In Alexandria and adjacent areas, the bedrock is commonly referred to as *crystalline rock*, a general term for igneous and metamorphic rocks, which occur at the surface in the Piedmont west of the Fall Zone and are present at depth beneath the poorly consolidated Coastal Plain sediments further to the east

*bedrock surface* – the eroded top of the Piedmont bedrock, upon which younger Coastal Plain and other surficial sediments were deposited. The bedrock surface is a readily recognizable horizon in the subsurface throughout the Coastal Plain and represents a marked *angular unconformity* separating strata of vastly different ages

*biotite* – member of the mica group of minerals, aka black mica; potassium-iron-magnesium silicate; a common constituent of granitic and metasedimentary rocks

*boulder* – particle greater than 10" (256 mm) in size

*breccia* – sedimentary or volcanic layer or rock unit composed chiefly of angular fragments of other rocks or sediments, frequently randomly oriented. Compare to *conglomerate*; see also *fault breccia*

*brittle* – physical state in which materials deform or break with little or no plastic flow; the opposite of ductile

*Cambrian* – Period of geological time lasting from about 542 to 488 million years ago. Part of the early Paleozoic Era

*Cenozoic* – major era of geologic time following the Mesozoic Era. Extends from about 65 million years ago to the present, and includes the Tertiary and Quaternary Periods

*clast* – sedimentary particle produced by the weathering and breakdown of older rocks and sediments. Common usage refers to megascopic particles, e.g., *sand* through *boulders*, but in this atlas it also includes fragments composed of *silt* and *clay*. See *rip-up*

*clay* – distinctive class of electrochemically active, aluminosilicate minerals less than 2 microns in size and having a sheet structure. Important types of clay minerals in the map area include: *illite*, in which potassium is usually the main base element; *kaolinite* (fire clay), which forms during prolonged, intense weathering and generally lacks an exchangeable base element; *expandable lattice clays*, such as *montmorillonite*, which contain sodium and calcium as the main base elements; and *chlorite-vermiculite*, mica-like clays containing iron and/or magnesium as the main base element

*Coastal Plain* – major geologic and physiographic province located between the Appalachian Piedmont and the modern Atlantic and Gulf of Mexico coasts in the southeastern US. The Coastal Plain is generally underlain by poorly consolidated marine, estuarine, and fluvial sediments of early Cretaceous age and younger and is typified by low relief at most places

*cobble* – particle between 2.5" (64 mm) and 10" (256 mm) in size; larger than *gravel*, smaller than *boulders*

*colluvium* – sediment that moves down hillsides under the influence of frost heaving and gravity, and derived from older formations that crop out on and above the hillside

*cone of depression* – area of depressed water levels in an aquifer resulting from long-term withdrawals of ground water by wells. Typically cone-shaped in three-dimensional space

*confining unit* – poorly permeable formation or horizon that does not readily transmit economically or environmentally significant volumes of water and typically yields much less water to a well or spring than adjacent strata. Syn: *aquitard*

*conglomerate* – sedimentary layer or rock unit composed chiefly of well-rounded pebbles or larger clasts of other rocks or sediments. Compare to *breccia*

*cosmogenic isotopes* – isotopes produced on or near the earth's surface by cosmogenic radiation. In some situations, measurements of the relative concentrations of these isotopes in conjunction with their decay rates can be used to estimate the age of sediments and landforms

*Cretaceous* – Period of geological time lasting from about 144 to 65 million years ago and the last of three periods that comprise the *Mesozoic Era*

*crevasse splay* – thin, arcuate to fan-shaped sheets of sand deposited on the floodplain surface adjacent to breaches in *natural levees*

*cross bed* – inclined internal laminations within a sandy or gravelly bed, oriented at right angles to the direction of current flow. The direction in which the laminae are inclined typically points in the direction of former current flow. Cross beds may be bounded by simple planar surfaces (planar cross bedding) or may be trough-shaped (trough cross bedding) with complex cut outs of adjacent beds called *cut and fill structure*

*crystalline rock* – a general term for igneous and metamorphic rocks, which make up the lower Paleozoic *bedrock* in the map area

*cut bank* – bluff or steep bank formed along the outside of a meander where stream power is directed. The undercutting action continually removes rock and sediment from the base of the landform, which oversteepens the bank, dislodging more material from above

*debris fan* – general term for slope deposits derived from erosion or landsliding of hillsides and deposited in the shape of a fan, typically at the base of a hillside

*debris flow* – general term for liquefied material that flows downslope. A common mechanism involved in landslides

*diagenetic* – chemical and physical changes in sediment following deposition, such as compaction, chemical alteration, and cementation

*diamictite* – general descriptive term for poorly sorted, weakly to non-stratified rocks with a bimodal grain-size composition that commonly consists of pebbles and larger clasts dispersed in a matrix of mud. The term is inherently non-genetic, as diamictites can originate through a variety of sedimentary and volcanic processes, including glaciation, landslides and mudflows, volcanic eruptions, and several others

*diamicton* – the *unconsolidated* equivalent of diamictite

*ductile fault* – a fault that deformed rocks in a hot and plastic state. Displacement of rocks across such a fault results mainly from internal stretching and flattening of crystal lattices, and by wholesale recrystallization under metamorphic conditions, rather than by brittle breakage and grinding of rocks as in a cold, brittle fault. See *mylonite*

*earthquake* – the sudden release of built-up *seismic energy* when a fault ruptures or a volcano erupts

*effective porosity* – the percentage of a rock or sediment made up of interconnected openings; the ratio of water that can be extracted from a volume of rock or sediment to the total amount of water needed to completely saturate the same volume

*entisol* – one of the 12 great soil orders, entisols are young soils with no horizonation other than an incipient topsoil sitting directly on unweathered parent material. Commonly found on modern *alluvial* deposits. Means “recent soil”

*epicenter* – the location on the land surface directly above the *hypocenter* of an *earthquake*

*equipotential line* – contour connecting points of equal *hydraulic head* in three-dimensional space in an aquifer or aquifer system. At any given point in the system, *ground water* flow is perpendicular to the equipotential lines

*escarpment* – a steep face or bluff terminating a higher landform. Syn: scarp

*estuary* – tidally influenced drainages and streams adjacent to sea level, characterized by *marsh*-dominated ecosystems that trap sediment, producing extensive tidal mud flats

*evapotranspiration* – the removal of water from a landscape through transpiration by plants and direct evaporation from the soil surface and water bodies

*expandable lattice clay mineral* – a member of the smectite (montmorillonite) group of clay minerals. The clays in this group are characterized by structures susceptible to extreme volume changes (shrinking and swelling) when water is added to or removed from the crystal lattice, a property that poses significant geotechnical challenges for foundations and natural slope stability

*facies* – subdivisions of a rock or sediment body that differ from one another based on appearance, composition, primary geometry, and/or fossil assemblages and which are inferred to have been deposited or formed in distinctly different depositional environments

*Fall Zone* – physiographic boundary between the *Piedmont* Plateau on the west and the *Atlantic Coastal Plain* on the east, marked by a prominent zone of rapids and small waterfalls along streams as they ‘fall’ off the resistant *crystalline rocks* of the Piedmont onto the much softer unconsolidated sediments of the Coastal Plain. The Fall Zone extends from New Jersey to Alabama. The Great Falls of the Potomac River is emblematic in our region

*fan* – lobate or apron-shaped body of sediment, commonly deposited at the bottoms (toes) of slopes (*colluvial fans*) and in front of the mouths of ravines (*alluvial fans*)

*fat clay* – the geotechnical engineering term for expandable lattice clays with high shrink-swell potential. Likewise, the term *elastic silt* is used to designate fine silts that contain a significant proportion of expandable clays. *Lean clay* is the term used for non-swelling clays

*fault* – discontinuity in the geologic section resulting from displacement of strata on either side of the discontinuity. Faults of several types and ages are recognized within the map area, with displacements ranging from a few inches to potentially tens of miles. *Strike slip faults* are present in the Paleozoic bedrock and result from predominantly horizontal motion, or translocation, of the rocks on opposite sides. In Alexandria, the Rock Creek Shear Zone is a very large, terrane-bounding strike slip fault that separates the Potomac terrane on the west from the Chopawamsic terrane to the east. The motion on a strike slip fault is described by the relative direction of displacement of one side of the fault as seen from the opposing side: *dextral* means right-lateral—the opposing side moved to the right; *sinistral* means left lateral—the opposing side moved to the left. In contrast, *reverse faults* are characterized by relative vertical motion of the two blocks on opposite sides of a dipping fault plane, with the downdip block (known as the 'hanging wall') moving up relative to the updip block (the 'footwall'). This style of faulting typifies the displacement observed across the relatively young faults that offset Coastal Plain strata in the greater DC area. A *thrust fault* is a class of reverse faults with a low angle of dip, typically 30 degrees or less. In a *normal fault*, the hanging wall has moved down relative to the footwall.

*fault breccia* – zone of broken or shattered rock or cohesive sediment within a fault zone; formed under *brittle* conditions

*fault gouge* – powdery or clayey material within a fault zone; formed by grinding or milling of material by fault motion under *brittle* conditions

*felsic* – rich in feldspar and silica. Typically applied to granitic intrusive rocks (*granite*, *granodiorite*, *tonalite*) and their volcanic and metamorphic equivalents

*fissility* – tendency to split apart along closely spaced planes, typically parallel to bedding

*flexure* – a gentle upwarping or downwarping of strata; a shallow fold

*floodplain* – low lying land bordering a stream and subject to inundation, scouring, and(or) deposition of *alluvium* at regular intervals. Floodplains are commonly characterized by how frequently they are expected to be inundated (e.g., annual floodplain, 100-year floodplain) based on their elevations relative to measured flood heights on the adjacent stream

*floodway* – the part of the *floodplain* inundated by the average annual flood

*fluvial* – produced by rivers

*foliation* – the alignment of minerals or particles into distinct, parallel or subparallel bands, like the pages of a book. Commonly used as a broad term encompassing a variety of fabrics found in *metamorphic rocks*

*formation* – the primary subdivision of geologic mapping and description, commonly applied to rock units having lithologic, mineralogic, and/or biologic characteristics distinct from adjacent rock units, and which typically occupy consistent *stratigraphic* positions in relation to adjacent units. Formations may be aggregated into groups or subdivided into *members*. The term is most commonly applied to bedded or layered rock units of sedimentary, metamorphic, or igneous origin, but may be applied to any type of rock unit. Formations are usually named for the place where the rock unit was first described, e.g., the *Potomac Formation* is named for outcrops along the Potomac River near DC, whereas the Lake Barcroft Metasandstone is named for exposures at Lake Barcroft in Falls Church, VA

*fragipan* – diagnostic soil horizon characterized by coarse prismatic or columnar structure, extreme hardness, brittle consistency, and seasonal hydrology (waterlogged during wet seasons, dry otherwise). Fragipans are acidic and typically found in relatively old soils. A type of hardpan, fragipans are virtually impenetrable by plant roots and inhibit soil drainage

*gabbro* – medium to coarse-grained, dark-colored intrusive rock composed chiefly of the minerals *pyroxene* and *plagioclase* feldspar. Some varieties also contain *hornblende* and/or *quartz*. Commonly metamorphosed to *amphibolite* in the map area. Typically weathers to a clayey, stony, but fertile soil high in calcium and magnesium

*geophysical* – pertaining to the branch of physics dealing with the earth; the application of physics to characterizing the behavior of the earth

*geotechnical* – refers to the engineering properties of geologic materials. Geotechnical engineering is the subset of civil and environmental engineering that deals with the engineering performance of earth materials and the broader geologic environment

*Gondwanaland* – the southern supercontinent made up of South America, Africa, Antarctica, Australia, and southern India, which existed from approximately the mid *Paleozoic* until its component continents drifted apart in the *Mesozoic*

*granite* – medium to coarse-grained, light colored *intrusive rock* rich in *quartz* and *feldspar*, commonly with accessory mica and/or *hornblende*, giving the rock a “salt-and-pepper” appearance. *Potassium feldspar* is typically more abundant than *plagioclase* feldspar. *Monzogranite* refers to very light-colored rocks in Holmes Run Gorge composed mostly of quartz, potassium feldspar, and *muscovite* (white mica). Granite typically weathers to a loamy, feldspathic soil with low to moderate fertility

*granodiorite* – similar to granite in origin and appearance, but differs in chemical composition, in that *plagioclase* feldspar is about twice as abundant as *potassium feldspar*

*gravel* – particles between 1/32” (2 mm) and 2.5” (64 mm) in size; larger than *sand*, smaller than *cobbles*

*ground water* – all water contained in soil and geologic formations beneath the surface of the earth

*ground water recharge area* – area of land characterized by downward movement of water into *aquifers* from the overlying land surface. Recharge areas typically coincide with both topographically and *piezometrically* elevated areas

*ground water discharge area* – area of land characterized by upward or lateral movement of ground water to the land surface from subjacent *aquifers*. Discharge areas commonly coincide with both topographically and *piezometrically* low areas

*high-capacity well* – water well capable of pumping 100,000 gallons per day or more

*Holocene* – geologic epoch from 11,000 years ago to the present. In North America, generally corresponds to the period following the most recent *Ice Age*. Syn: *Recent*

*hornblende* – A calcium aluminum silicate in the amphibole family of minerals. Commonly found in igneous rocks. Typically dark green to black, with a prismatic or needle-like shape

*hydraulic conductivity* – the measure of the ease with which a fluid, usually water, will flow through a porous medium, such as sand or gravel

*hydraulic head* – the potential hydraulic energy at any given point in an *aquifer* or *aquifer system*, represented by the water level in a well open at that point

*hydrogeology* – that branch of geology pertaining to the interaction of water with the geologic and human environments

*hydrophytic* – adapted to or requiring wet growing conditions

*hypocenter* – the point in the subsurface where an *earthquake* rupture starts; also referred to as the *focus*

*Ice Age* – a period of generally colder and wetter climate in the temperate latitudes, during which glaciers advanced and coalesced into continental ice sheets. Often associated with major periods of sea level lowering as large volumes of water became locked up in ice sheets. Several Ice Ages are documented in the geologic record over at least the past 2 billion years; however, the term 'Ice Age' is frequently used in reference to the most recent period of glaciation that began at least a million years ago during the *Pleistocene Epoch*

*intensity* – generally refers to the amount of shaking caused by an *earthquake*; more specifically refers to the strength of shaking measured by the modified Mercalli intensity index

*interflow* – the intermittent downhill flow of shallow *ground water* through soil, loose sediment, and weathered rock close to the surface (and above the *water table*) on hillsides

*intermittent stream* – stream that flows for only part of the year, or only after major storms

*intrusive rock* – coarse-grained igneous rock such as *granite*, *tonalite*, or *gabbro* that was intruded into older rocks as liquid magma. Intrusive rocks crystallized slowly beneath the surface of the Earth, in contrast to volcanic, or extrusive, rocks that were erupted onto the surface and cooled rapidly. Syn: plutonic rock

*isoclinal fold* – a fold so tight that the dips of the two limbs parallel one another

*joints* – systematically oriented fractures in bedrock that form from a variety of causes, including weathering, unloading of overlying rock and sediment, and tectonic stresses. Joints differ from *faults* in that they exhibit no differential movement, or displacement, of the rock on either side, and they commonly occur in sets having near-parallel alignment

*kyanite* – an aluminum silicate mineral formed under high temperature-high pressure conditions during regional metamorphism of aluminous rocks

*lag gravel* – residual deposit of angular to rounded gravel, cobbles, and boulders from which most of the finer particles have been removed by erosion. Typically occupies ridges, hilltops, and benches on hillsides

*landform* – a discrete feature of the landscape, such as a *plateau*, stream valley, or *escarpment*. The characteristics of a specific landform often imply a specific geologic history or process, for example, a stream valley indicates incision by running water. Many landforms also are associated with specific kinds of rock or sediment, for example, an *alluvial fan* is composed of sediment deposited by running water at the mouth of a stream

*landslide* – general term referring to the failure of a hillside, resulting in perceptible downhill movement of a relatively coherent mass of rock and(or) sediment

*lignite* – dark brown organic material derived from plant remains, more compacted than *peat* but less so than coal

*liquefaction* – transformation of a soft sediment into a viscous liquid, resulting in a loss of strength; most commonly occurs in saturated sandy sediment when pore pressure exceeds frictional stresses

*lithic* – containing rock fragments

*lithified* – consolidated into rock

*lithofacies* – the general sedimentary characteristics of a geologic *formation* or other set of strata (e.g., a *member of a formation*) within a given area, commonly used to indicate the local sedimentary environment and to discriminate different kinds of depositional environments that may be represented within a given stratum or formation, e.g., channel sands versus lake clays

*lithology* – the physical appearance and characteristics of a rock, i.e., rock type

*loam* – textural term referring to soil or sediment composed of broadly subequal amounts of *sand*, *silt*, and *clay*. Figures 4-7 and 5-6 show the loam field on the USDA textural triangle

*loess* – windblown silt, dust

*mafic* – refers to dark-colored rocks rich in ferromagnesian minerals such as *hornblende* and *pyroxene*

*magnitude* – refers to the total *seismic energy* released by an *earthquake*; measured on several slightly different magnitude scales (e.g., the Richter scale), all of which are logarithmic, meaning each whole number increase on the scale represents a ten-fold increase in the amount of energy released

*Mesozoic* – one of the major eras of geologic time, following the *Paleozoic Era* and preceding the *Cenozoic Era*. Lasted from about 250 million to 65 million years ago, encompassing the Triassic, Jurassic, and *Cretaceous* Periods. Syn: Age of Dinosaurs

*metamorphic rock* – a rock that was recrystallized and deformed in a solid state under temperatures and pressures much greater than those found near the earth's surface

*microfossil* – fossil remains of ancient organisms, or representative parts of organisms, and visible only at a microscopic scale. Pollen is a good example

*mottle* – an area or spot in soil or sediment of different color than the surrounding sediment matrix, and indicative of changing levels of oxygen caused by a seasonally fluctuating *water table*. Syn: redoximorphic feature

*muck* – dark colored sediment composed of a roughly equal mix of decomposed organic matter and mineral particles. Commonly found in low, wet places

*mud* – fine-grained sediment composed of various proportions of *silt*, *clay*, and fine *sand*



*muscovite* – member of the mica group of minerals, aka white mica; potassium aluminum silicate; a common constituent of *granitic* and *metamorphic rocks*

*mylonite* – fine-grained, closely foliated, and commonly banded *metamorphic rock* produced by intense *ductile* deformation and recrystallization of rocks during fault motion, typically at depths sufficient to sustain metamorphic conditions, resulting in moderate to extreme reduction in grain size. *Ultramylonite* results from this process being taken to its extreme conclusion, producing a fine grained rock with a locally welded or glassy appearance

*N value* – a standard measure of hardness used by the *geotechnical* industry, representing the number of blows required to advance a coring device 1 foot by driving a 140-lb hammer from a height of 30 inches

*natural community* – a characteristic association of plant and animal species, commonly recurring in specific landscape positions having similar underlying geologic strata, slope, moisture status, and(or) other causative processes. Similar to *vegetation community*

*natural levee* – low, narrow ridge of sediment, typically sand, deposited by floods adjacent to streams. Commonly parallels the adjacent stream channel

*Ordovician* – Period of geological time lasting from about 488 to 444 million years ago. Part of the early *Paleozoic Era*

*orogeny* – the process of forming mountains, particularly by folding, thrust faulting, and(or) metamorphism and intrusion. A specific mountain building event, e.g., the Taconic Orogeny of the *Ordovician Period*, one of several orogenies that built the Appalachian mountain chain

*outcrop* – the appearance, or exposure, of *bedrock* or *unconsolidated strata* through the overlying soil, surficial sediments, and vegetation that normally conceals them

*overbank deposit* – sediment deposited on a *floodplain*, typically *silt*, *clay*, and *fine sand*

*overland runoff* – the part of total precipitation that flows across the land surface into streams

*overconsolidated* – engineering term used to describe sediment that has not been buried sufficiently deeply to be lithified into rock, yet is unexpectedly hard compared to its present depth of burial. This condition implies that the sediment was previously buried by either a much thicker overburden that has since been stripped off by erosion, or another object of great mass, such as a glacier

*oxbow* – term applied to arcuate or crescent-shaped basins present on *alluvial* bottomlands and representing former river channels, now abandoned. *Oxbow lakes* are basins that contain water

*oxidation halo* – tan, red, or rusty brown coloration (oxidation) paralleling the walls of a joint, fault, or other discontinuity in otherwise dull-colored (reduced) sediment

*paleohydrology* – prehistorical hydrology; a hydrologic regime that no longer exists today

*paleosol* – *soil profile* that formed in the past, typically under conditions different from those acting on soils today. Many paleosols are buried by younger sediments and are often recognized in outcrop or boreholes by color changes and ancient *weathering profiles*

*Paleozoic* – major era of geologic time that lasted from about 570 to 245 million years ago, and marked by the widespread appearance of complex multicelled organisms. Means “Dawn of Life”

*Pangaea* – supercontinent composed of all of the world’s major continents, which existed from the late *Paleozoic* until the early *Mesozoic*. The Appalachian mountain belt figures prominently in the assembly of the supercontinent, its rocks documenting the collisions of Eurasia (in the mid Paleozoic) and *Gondwanaland* (during the late Paleozoic) with North America, the latter event culminating in the assembly of the supercontinent

*peat* – dark colored sediment composed of partially decomposed organic matter. Commonly fibrous, with recognizable plant parts. Preserved in low, wet places protected from oxidation

*pebble*– general term for *clasts* between 1/32” (2 mm) and 2.5” (64 mm) in size. See *gravel*

*pedogenic* – pertaining to the processes of soil formation

*petrographic* – pertaining to the systematics and classification of rocks and sediments

*Piedmont* – physiographic and geologic province of the Appalachian Mountains located between the Blue Ridge and *Coastal Plain*, and underlain mostly by complexly deformed and metamorphosed *crystalline rocks* and characterized by rolling topography and deep *weathering profiles*

*piezometric* – pertaining to the level to which water will naturally rise in an *aquifer system*

*piezometric contour* – line of equal water level elevation in an *aquifer* or *aquifer system*

*piezometric surface* – imaginary two-dimensional surface defining the static water level (hydraulic potential) at the top of the zone of saturation in an *aquifer* or *aquifer system*

*plagioclase* – one of the most common rock-forming minerals, this feldspar occurs in both *metamorphic* and igneous rocks. It is typically gray to white in color and ranges from sodium rich to calcium rich depending on the mode of origin

*plateau* – an elevated landmass characterized by a broad, relatively level upland surface bounded on one or more sides by sharp *escarpments*

*Pleistocene* – geologic epoch beginning about 2.6 million years ago and broadly corresponding to the most recent *Ice Age*. Makes up the major part of the *Quaternary Period* (the *Holocene* Epoch, from 11,000-present, makes up the rest)

*pluton* – body of *intrusive rock* that cooled slowly below the surface, allowing the minerals to grow to sizes readily visible with the naked eye

*point bar* – arc-shaped deposit of *sand*, *gravel*, and(or) *boulders* on the “point” at the inside of a bend along a stream. The fundamental architectural unit of *floodplain* deposits. Other types of stream *bars* are also named for their shapes, the most common being *longitudinal bars* and *transverse bars*

*pore pressure* – the force exerted by *ground water* residing inside the openings, or pores, between solid mineral grains in a rock or sediment. Pore pressure typically varies seasonally according to the rise and fall of the *water table*

*potassium feldspar* – common rock-forming silicate mineral in the intrusive rocks in the city. Typically white to pink in color, and rich in potassium. Microcline is the main variety

*Potomac Formation* – eastward-thickening wedge of *sand, gravel, silt, and clay* at the base of the *Coastal Plain* in Virginia, Maryland, Delaware, and New Jersey. The *formation* was initially named in 1885 for exposures along the north shore of the Potomac River near Washington, D.C. In the map area, the Potomac Formation contains much less gravel than in Maryland and DC, ranges from a feather edge to several hundred feet thick, and represents a massive *fluvial* sequence deposited by a major early *Cretaceous* river system flowing eastward across the *Piedmont*

*pyroclastic flow* – a sheet of ash, glass, crystals, and other rock debris violently ejected from a volcano

*pyroxene* – class of dark colored calcium-magnesium aluminum silicate minerals found in certain igneous and *metamorphic rocks*. The variety augite occurs in some of the more *mafic* intrusive rocks in the map area

*quartz* – the most common rock forming mineral, composed of silicon dioxide

*quartz arenite* – sand or sandstone composed mostly of *quartz* grains

*quartzofeldspathic* – refers to rocks composed mainly of *quartz* and feldspars

*Quaternary* – Period of geologic time from about 2.6 million years ago to the present, and composed of the *Pleistocene* and *Holocene* Epochs

*rip up* – fragment of cohesive sediment, usually containing appreciable *silt* and *clay*, floating in a sand body deposited by a current. The fragment is inferred to have been ripped up from a nearby substrate (streambank, tidal pool) by the current that deposited the sand

*rotational slump block* – a common type of *landslide* in which the slide consists of a coherent mass of material that moves by rotating along an arcuate to semi-cylindrical failure surface oriented roughly perpendicular to the slope of the *scarp*

*sand* – particles between 62 and 200 microns in size (1/16 – 2 mm, or 0.0025 – 0.08"). Sand is further divided into 5 grades: very coarse sand (1 – 2 mm); coarse sand (1/2 – 1 mm); medium sand (1/4 – 1/2 mm); fine sand (1/8 – 1/4 mm); and very fine sand (1/16 – 1/8 mm)

*Sangamon* – Interglacial stage during the *Pleistocene Ice Age* lasting from approximately 140,000 to 70,000 years before present and characterized by widespread weathering and soil formation. Preceded the *Wisconsin glacial stage*. Named for *paleosols* in Sangamon County, Illinois

*saprolite* – soft, weathered material that preserves the original texture and structure of the *bedrock* but is only about half as dense and can be readily excavated with a knife or trowel

*schistosity* – the alignment of mica and other platy minerals in a *metamorphic rock* to form a closely spaced *foliation*, similar to the pages in a book. *Bedding schistosity* refers to schistosity that parallels the original bedding, or compositional layering, in the host rock

*seepage face* – area of diffuse *ground water discharge*, commonly located on toeslopes, bluffs, and low ground adjacent to streams

*seepage swamp* – area fed by *springs* or diffuse *seepage faces* supporting a forested *ground-water* dependent ecosystem

*seismic energy* – the energy released by *earthquakes*, typically manifested as elastic waves in solid earth or water

*seismicity* – the frequency and types of *earthquakes* in a given region

*shear wave velocity* – as used here, refers to the measurement of the speed of a type of surface wave to determine the seismic properties of rock and sediment. Frequently measured by seismic cone penetration tests made in boreholes, using artificially generated seismic waves

*silt* – particles between 2 and 62 microns in size (1/256 – 1/16 mm). Some very fine silt (2 – 4 microns, or 1/256 – 1/128 mm) has electrochemical properties similar to clays and is included in the clay particle size class in some classifications

*skolithos* – sand-burrowing worm of the lower *Paleozoic*. The organism itself is rarely preserved, but is commonly represented in rocks by its distinctive burrows, which are a key type of trace fossil

*slope wash* – soil particles that have moved downslope in sheetlike fashion with the assistance of running water

*soil* – *unconsolidated sediment* sufficiently altered by physical, chemical, and biological processes to produce distinct soil horizons and support natural plant life. See *soil profile*. Geotechnical engineers commonly use the term “soil” to refer to all unconsolidated material above solid rock

*soil profile* – distinctive sequence of *soil* horizons starting at the soil surface (topsoil) and including one or more subsoil horizons. The soil profile results from accumulation of organic matter, leaching of base elements, oxidation (or reduction) of iron bearing minerals, translocation of clays, and many other pedogenic processes acting over time on various geological parent materials. Hundreds of different types of soil profiles exist in nature, and are strongly affected by the position in the landscape where they formed

*spring* – location where *ground water* flows naturally to the surface through one or more distinct orifices

*strain* – deformation of rocks caused by an applied force, for example, folds and faults produced by directional stress in the earth’s crust

*stratigraphy* – the arrangement, or order, of rock units in vertical and horizontal space

*subduction zone* – elongate boundary between two converging tectonic plates, where one plate (typically ocean crust) descends, or is subducted, beneath another plate. Commonly marked by an oceanic trench flanked by a range of volcanoes on the leading edge of the overriding plate

*tectonic* – relating to rock structure and associated landforms (e.g., mountains, basins) resulting from deformation of the earth’s crust

*tectonic fabric* – the alignment of linear, planar, and crystal structures that results from the tectonic history of a region

*terrace* – relatively level to sloping landform bounded by stream- or wave-cut scarps on at least one side. As used herein, terraces are inferred to be the remains of former stream courses left by the Potomac River and its precursor streams, i.e., former bottomlands when these streams flowed at higher levels in the landscape prior to more recent incision and(or) regional uplift of the landscape. Among the most striking examples are the upland terraces of late *Tertiary* age, some of which (e.g., the Dowden terrace of this atlas) stand hundreds of feet above modern river level and cover tens or hundreds of square miles

*terrane* – a fault-bounded geologic block of regional extent having a homogeneous internal *stratigraphy* and geologic history that differ from adjacent terranes

*Tertiary* – Period of geologic time extending from about 65 million years ago to the beginning of the *Pleistocene* Epoch about 2.6 million years ago. Collectively, the Tertiary and *Quaternary* (Pleistocene plus *Holocene*) comprise the *Cenozoic Era*. The Tertiary Period is in turn subdivided into five epochs, the two most recent being the Pliocene (2.6 – 5.3 ma) and Miocene (5.3 – 23 ma) Epochs. The Miocene and Pliocene collectively comprise the 'late Tertiary' of this atlas

*thalweg* – the deepest part of a stream channel or valley

*tidal marsh* – type of wetland populated by herbaceous vegetation (grasses, aquatic plants) and influenced by tidal action that regularly inundates and exposes a mud flat

*tonalite* – medium to coarse-grained, light to dark gray *intrusive rock* composed of *quartz*, *plagioclase feldspar*, *hornblende*, *biotite*, and less commonly, *pyroxene*. Typically weathers to a *loamy*, fertile soil high in base metals such as calcium, potassium, and magnesium

*topography* – the physical features (physiography) of a local landscape or a buried geologic surface, as represented by a map of the relief or contour of the landscape or surface

*transmissivity* – a measure of *aquifer* productivity equal to the *hydraulic conductivity* multiplied by the saturated thickness. Typically determined from pumping tests

*tsunami* – seismic wave manifested in an ocean or other large waterbody

*ultisol* – one of the 12 great soil orders, ultisols are deeply weathered, reddish, acidic soils found on old landscapes in humid tropical or humid temperate regions. All, or nearly all, of the original base metals in the mineral constituents (calcium, potassium, etc.) have been removed by weathering, leaving mainly silica, aluminum, and iron. Means "ultimate soil"

*unconformity* – hiatus in the geologic record represented by the boundary between two layers or *formations*. Unconformities can represent either relatively short or very long intervals of geologic time, and can arise from either periods of non deposition, or by erosion of the older rocks prior to deposition or emplacement of the younger rocks

*unconsolidated sediment* – sediment (sand, gravel, silt, clay) that has not been lithified into rock and which can generally be excavated using simple hand tools

*underfit* – refers to a valley that appears far too large to have been made by the stream currently flowing in it

*urban storm-water runoff* – surface runoff conveyed directly from impervious surfaces (e.g., roofs, streets) into streams by gutters, drains, storm sewers, and similar infrastructure

*vegetation community* – a characteristic and recurring association of plant species, commonly found in a specific place in the landscape with respect to underlying geologic strata, slope, or hydrologic processes. Broadly synonymous with *natural community*

*ventifact* – faceted, flatiron-shaped clast shaped by prolonged exposure to wind

*vertisol* – one of the 12 great soil orders, vertisols are high in *expandable clay minerals* that cause the soil profile to expand and contract greatly with seasonal and other changes in moisture content. The large volumetric changes and regular heaving produce a distinctive “A/C” soil profile characterized by extremely thick topsoil (A horizon) sitting directly on the weathered parent material (C horizon), along with other structures indicative of strong vertical motion, such as slickensides and deep, near-vertical cracks. Vertisols are unstable for structures. In the map area, vertisols occur only as *paleosols* within the *Potomac Formation*—ancient, buried soil horizons that formed during periods of nondeposition and weathering, before being buried by deposition of additional Potomac Formation sediments

*watershed* – the land area contributing to a stream, lake, or other drainage network

*water table* – the interface between the saturated and unsaturated zones, below which all openings in the rock or sediment are filled with *ground water*. A *perched water table* occurs where a poorly impermeable sediment body retards the downward movement of ground water and causes a secondary water table to become perched above the main water table

*weathering profile* – vertical sequence showing the progressive succession of weathering effects starting at the soil surface and continuing down to unweathered rock or sediment. Includes the *soil profile* (pedogenic sense), and subjacent layers whose color and other properties are altered by physical, chemical, and biological weathering processes. The weathering profile is commonly, though not always, identified by different colors from the original unaltered parent material

*Wisconsin Stage* – the most recent glacial stage of the *Pleistocene Ice Age*, lasting from about 70,000 to 11,000 years before present and characterized by extensive advances of continental ice sheets into North America and other northern temperate regions

*xenolith* – an inclusion of older rock engulfed in an *intrusive rock*

*zircon* – zirconium silicate, a common accessory mineral in volcanic and *intrusive rocks*. Typically contains isotopes of uranium in its crystal structure, whose known half-lives can be used to date the age of crystallization of the crystal, and even parts of it, and thus determine the age and metamorphic history of the host rock